GROUP SIZE AND COMPOSITION OF INDIAN PEAFOWL (*PAVO CRISTATUS*) IN AN AGRO-ECOSYSTEM AT ALIGARH, UTTAR PRADESH[1]

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(*With two text-figures*)

Key words: *Pavo cristatus,* group size, group composition, social organization, photoperiodic length.

Variation in group size and composition of Indian peafowl (*Pavo cristatus*) was investigated in an agro-ecosystem at Aligarh during 1993-94. The area included a patch of scrubland and plantation surrounded by a vast expanse of crop fields. There was significant seasonal variation in group size and significant difference in group size between 'closed' habitat (scrubland and plantation) and 'open' habitat (crop fields). This was attributed to social organization and difference in availability of food between the two habitats. Seasonal variation was found in group composition too. This was attributed to the reproductive pattern and social organization of peafowl.

INTRODUCTION

The variation in group size is considered as part of the species' adaptation to its environment (Southwell 1984). This variation could be due to habitat structure, spatio-temporal distribution of food and predation pressure (Barrette, 1991). The Indian peafowl (*Pavo cristatus*) is common and widely distributed in the Indian subcontinent. However, very little work has been done on its ecology. Trivedi (1993) has observed that group size of peafowl varies due to habitat structure and spatial distribution of food. As resource abundance changes with changing season, variation in group size is expected between the seasons as well. Since peafowl has adapted well to human-altered environment, it would be interesting to study its grouping pattern in such an environment. This paper investigates variation in group size and composition in a peafowl population living in an agro-ecosystem.

STUDY AREA

The study area was located on the outskirts of Aligarh town (27° 30' N, 79°40' N). It included scrubland and plantation (area=14.5 ha) surrounded by a vast expanse of crop fields on one side and human habitation on the other. The scrubland had natural vegetation comprising *Azadirachta indica, Holoptelia integrifolia, Dalbergia sissoo* and *Cordia dichotoma, Capparis sepiaria* was the shrub cover. The plantation had certain fruit and ornamental trees such as *Mangifera indica, Psidium guajava, Emblica officinalis, Syzigium cuminii, Morus alba, Putranjiva roxburghii, Pongamia glabra, Bombax ceiba, Polyalthia longifolia,* and *Delonix regia.* The ground cover in the scrubland comprised *Panicum antidotale, Achyranthes aspera, Chenopodium album, Setaria verticillata, Cenchrus ciliaris, C. alia, Teramnus labialis* and *Pluchea lanceolata.* The ground cover in the plantation was dominated by *Dichanthium annulatum, Pluchea lanceolata* and *Cynodon dactylon.* A crop field was located about 50 m from the scrubland and was planted with wheat (*Triticum aestivum*), mustard (*Brassica campestris*) and potato (*Solanum tuberosum*) during winter; vegetables during summer; bajra (*Pennisetum typhoides*), jowar (*Hordeum vulgare*) and maize (*Zea mays*) during monsoon.

Aligarh experiences a tropical monsoon type of climate. January was the coldest month with maximum and minimum temperatures

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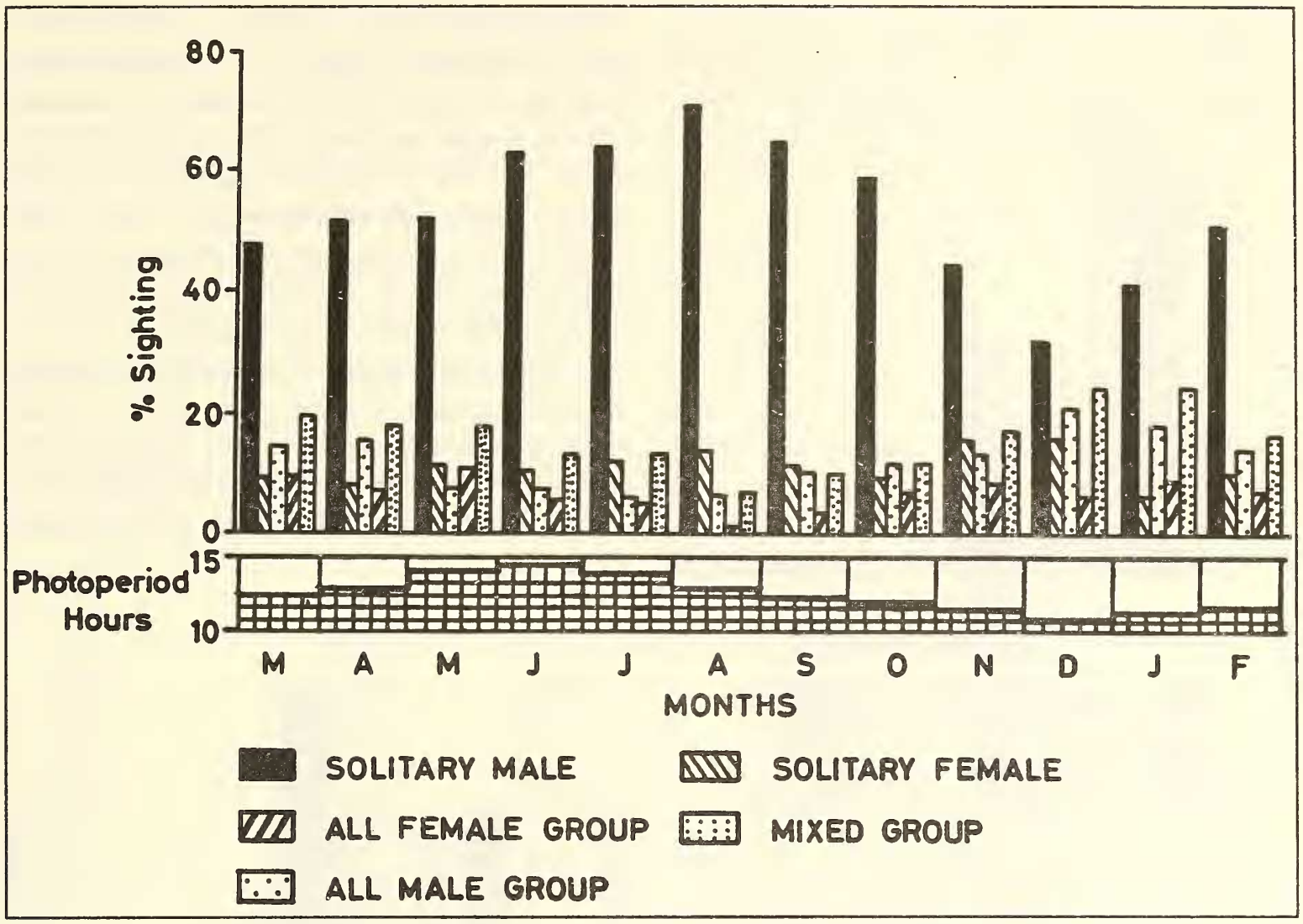

Fig. 1. Seasonal variation in group composition of peafowl.

20.6°C and 7.9°C respectively. May was the hottest month with maximum and minimum temperatures 41.4°C and 24.3°C respectively. Average rainfall was 5.325 mm in winter, 18.05 mm in summer and 150.97 mm in monsoon.

Methods

Between March 1993 to February 1994 data on group size were collected while studying the habitat utilization pattern of the peafowl. The peafowl population within the study area fluctuated between 40-67 with the minimum in January 1993 and the maximum in May 1993. Median group size was calculated for different seasons. Summer season comprised March-June, monsoon comprised July-October and winter months were November-February. During analysis, the data from scrubland and plantation were pooled and compared with that of the crop fields. Data from scrubland and plantation were pooled to see whether the group size varied significantly between a 'closed' habitat (scrubland and plantation) and an 'open' habitat (crop fields). Extension of the median test (Siegel, 1956) was used to compare the group size of peafowls in 'closed' and 'open' habitats. Chi-square was used to test the seasonal variation in group composition. Spearman rank correlation (rs) was used to measure the relationship between the photoperiodic length and proportion of solitary males per month. Photoperiodic length was calculated from sunrise and sunset data.

Results

Group size: The median group size of peafowl was one in all the three seasons. There

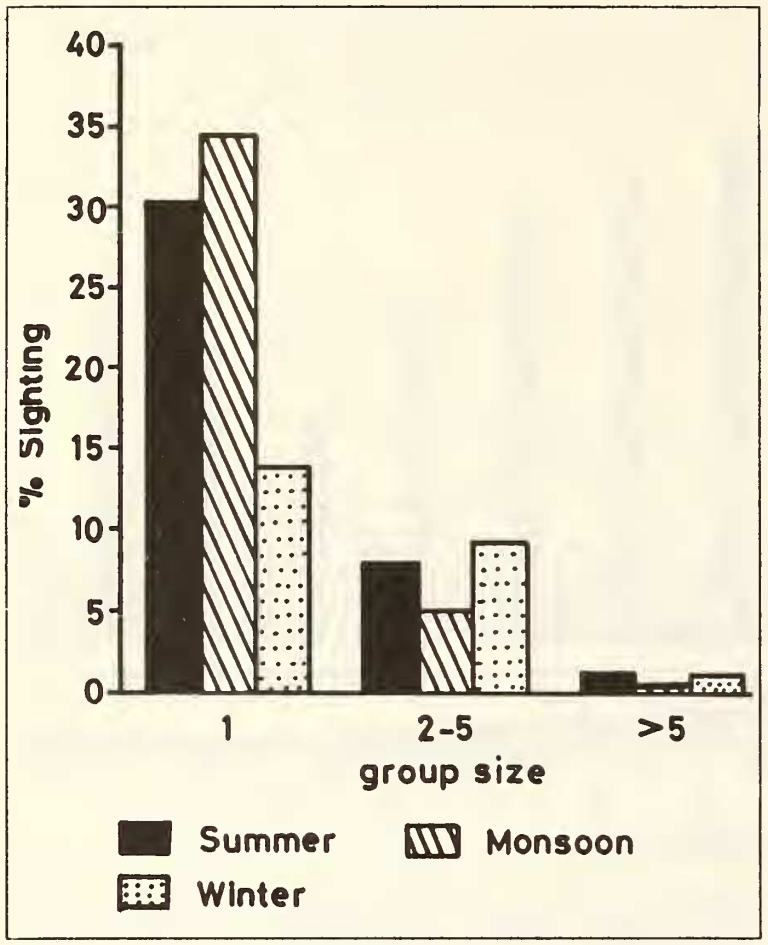

Fig. 2a. Grouping pattern of peafowl, adult male

was significant seasonal variation in group size (χ^2 = 73.01, d.f. = 2, P<0.001). The variation in group size between 'closed' area 'open' area was also significant (χ^2 = 30.49, d.f. = 1, P <0.001). Solitary birds were seen more in the closed area (70% of 1828 groups) than in the open area (34.9% of 358 groups).

Group composition: The group composition changed seasonally (χ^2 = 84.3, P<0.001, d.f. = 8). The proportion of solitary males was positively correlated to the average photoperiodic length per month (rs = 0.59, P<0.05). Three age classes of males could be differentiated on the basis of train elaboration and plumage differentiation. All the three age classes of males showed difference in grouping pattern (Fig. 2a-d).

Adult males: Total sightings of adult males were 1209. 78.7% occurred singly and 21.3% in groups. They formed 32.9% of groups with adult males, 28.7% with females, 25.9% with sub-adult males, 8.1% with immature males, 13.9% with sub-adult females, 3.1% with immature males and females, 2.3% with sub-adult and immature males, 5.4% with sub-adult, immature males and females. Single adult males showed a seasonal change (G = 9.952, P<0.01, d.f. = 2). The occurrence of adult males in groups did not vary seasonally (G = 1.377, NS). During the breeding period the proportion of single males was 30-34% which dropped to 13.9% in the non-breeding period (Fig. 2a).

Sub-adult males: Total sightings of sub-adult males were 532. Of them 43.4 occurred singly and 56.6% in groups. They formed 35.2% of groups with females, 22.3% with adult males, 11.6% with sub-adult males, 4% with immature

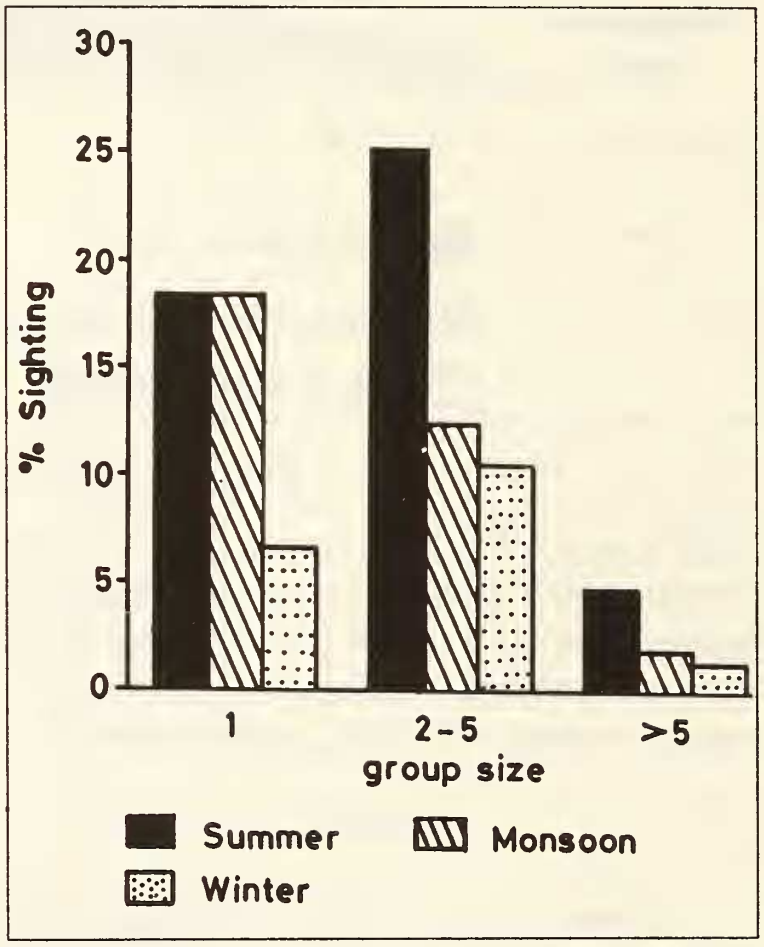

Fig. 2b. Grouping pattern of peafowl, sub-adult male

males, 11.9% with adult males and females, 9.3% with immature males and females, 2% with adult males and immature males and 4.6% with adult males, immature males and females. Single sub-adult males showed a seasonal change (G = 7.384, P<0.05, d.f. = 2) and their occurrence in groups also varied seasonally (G = 9.258, P<0.01, d.f. = 2) (Fig. 2b).

Immature males: Total sightings of immature males were 228. Of them 19.7% occurred singly while 80.7% occurred in groups. They formed 43.2% of groups with females, 12.6% with immature males, 11.5% with adult males, 6.6% with sub-adult males, 15.3% with sub-adult males and females, 4.4% with adult males and females, 3.3% with adult males and sub-adult males, 7.7% with sub-adult males, adult males and females. There was no seasonal variation in the occurrence of immature males either as singles (G = 1.093 NS) or in groups (G = 2,962, NS) (Fig. 2c).

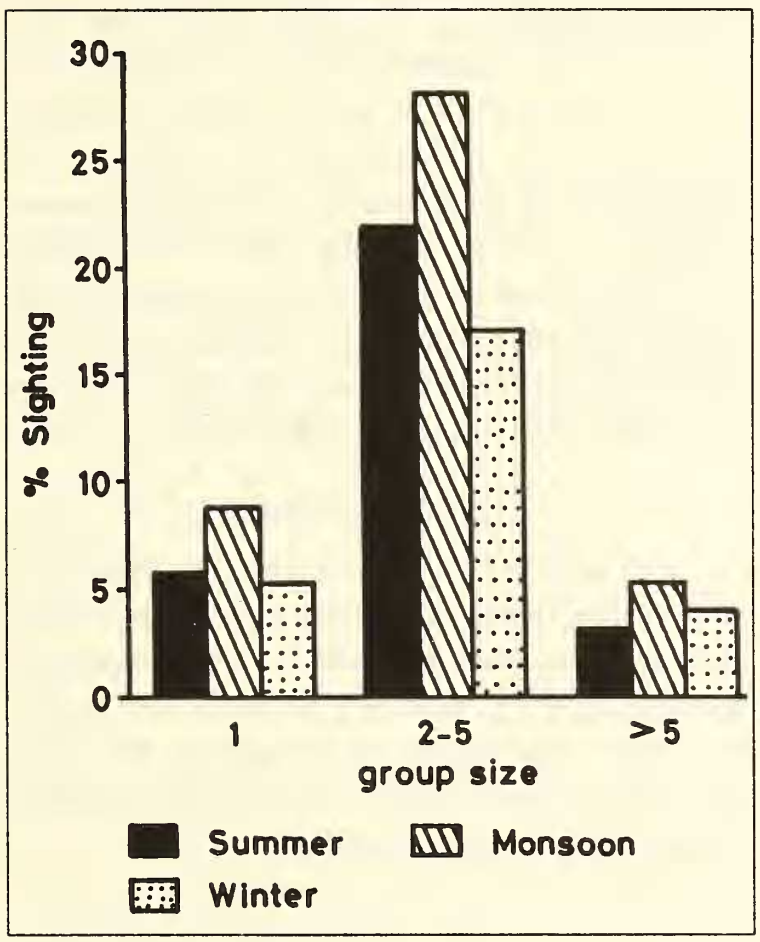

Fig. 2c. Grouping pattern of peafowl, immature male

Females: Total sightings of females were 721. 34.8% of females occurred singly while 65.2% occurred in groups. They formed 27.9% of groups with females, 22.6% with immature males, 15.7% with adult males, 7.7% with adult males and sub-adult males, 6% with sub-adult males and immature males, 1.7% with adult males and immature males and 3% with adult males, sub-adult males and immature males. There was no seasonal variation in the occurrence of females as singles (G = 1.088 NS) or in groups (G = 4,934, NS) (Fig. 2d).

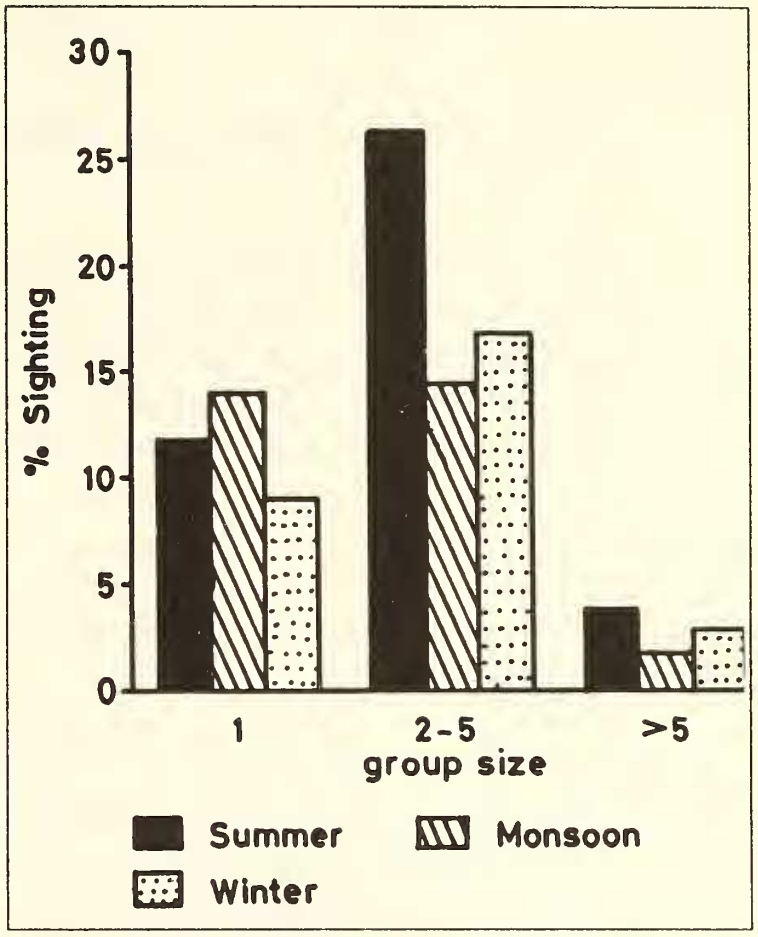

Fig. 2d. Grouping pattern of peafowl, female

Discussion

The high seasonal variation in group size of peafowl can be attributed to the social organization. All the age and sex classes were observed to be temporarily associated, except for the females and chicks, which had a strong bond. Species with a closed family unit structure exhibit a constant group size whilst those with an open structure exhibit large seasonal changes (Rodgers, 1977). Peafowl exhibits an open membership social structure. The seasonal variation in group size did not appear to be governed by the availability of food, as the species did not face "resource crunch" due to the presence of crop fields around the study area. The variation of group size between the 'closed' and

'open' habitats could be explained by the structural differences of the two habitats and the difference in the availability of food between the two habitats. While the crop fields provide a perennial supply of food, there is scarcity of food during summer in the 'closed' habitat (Yasmin, unpubl. data). Occurrence of greater proportion of groups in the open habitat suggests an anti-predator strategy in response to structural differences in the two habitats, but at the same time feeding by 'local enhancement' (Hinde, 1961) is also important in peafowl because birds were seen flying directly from roost and joining the feeding flocks in the crop field. Clark and Mangel (1984) suggest that birds flock in response to patchy distribution of food rather than in response to predation pressure. I find that peafowls aggregate in the crop fields in larger group size mainly because of high food availability and partly due to increased vigilance.

The seasonal variation in group composition could be influenced by the reproductive pattern and social organization of peafowl. The adult males might have the tendency to remain solitary due to aggressiveness. When the birds were baited on wheat in the non-breeding season (February), usually the females and sub-adult males fed amicably, with some sporadic fighting. However, when the adult male arrived, it invariably pecked the sub-adult males away. There was an increase in the males' solitary behaviour during the breeding season as the males established territories (i.e. from June-September). The monthly variation in solitary behaviour of males in response to monthly photoperiodic length suggests that photoperiod acts as a cue for the onset and offset of breeding season. The sub-adult males showed grouping pattern intermediate between that of adult males and immature males. They showed seasonal change in both solitary behaviour and formation of groups. This was probably because sub-adults tend to establish territories and display near adult males as well as join the female groups while the latter visit lek. The immature males and females did not show seasonal change either as singles or as groups. This was probably because immature males and females tend to live in groups for at least one year and there was a tendency of broods to be together. The females became solitary in the post-mating season because of egg laying and incubation. The proportion of mixed groups rose in the postbreeding season in winter when the adult males had undergone moulting and abandoned lek and the females had brought out the chicks.

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References

Barrette, C. (1991): The size of Axis deer fluid group in Wilpattu National Park, Sri Lanka. *Mammals 55(2)*: 207-220.

Clark, C.W. & M. Mangel (1984): Foraging and flocking strategies: Information in an uncertain environment. *Amer. Nat. 123*: 626-641.

Hinde, R.A. (1961): Behaviour, *In*: Biology and Comparative Physiology of Birds, Volume 2 Ed. A.J. Marshall, Academic Press, New York, pp 373-441.

Rodgers, W.A. (1977): Seasonal change in group size amongst five wild herbivore species. *E. Afr. Wild. J. 15*: 175-190.

Siegel, S. (1956): Nonparametric statistics for the Behavioural Sciences, McGrawhill Book Co. *Inc.* London.

Southwell, C.J. (1984): Variability in grouping in the eastern grey kangaroo, *Macropus giganteus*, Group density and group size. *Aust. Wild. Res. 11*: 423-435.

Trivedi, P. (1993): Habitat Selection by Indian Peafowl (*Pavo cristatus* Linn.) in Gir Forest. M.Sc. dissertion, Saurashtra Univ.